Loss Prevention Standards – Asset Classes

Roof Mounted Photovoltaic Solar Panel Systems - 15 Top Tips

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Roof mounted Photovoltaic/Solar arrays are becoming increasingly common, and unfortunately, these power generating systems can catch fire. Their combustibility and location can expose buildings, contents, and trading activities to fire related loss. This document provides 15 top tips to help care for PV/Solar systems and prevent such events occurring.

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Introduction

Whilst the provision of roof mounted Photovoltaic (PV) and Solar systems are intended to provide an environmental benefit, fires are being increasingly reported, typically due to poor maintenance, damaged or faulty components, electrical arcing in switchgear, control cabinets and inverter equipment, and even water damage to cabling and connectors. Inverter equipment is often located in accessible locations, often with little segregation from general processes and combustible items, which can aid fire spread within the building, in the event of ignition.

Fire in the PV/Solar panels themselves can spread rapidly and are difficult to control and extinguish due to panel combustibility; access limitations; air currents which support fire growth, and the continually live nature of the PV/Solar panels. Firefighting can also lead to significant firewater contamination, notwithstanding damage to the building and contents as well as environmental impacts.

As a result, the following top tips are presented to help ensure roof mounted PV/Solar systems operate safely and are not unduly exposing the property, the business activities, and the surrounding environment to fire related damage. These '15' are in addition to 'normal' expected ignition source management, such as prohibiting smoking or vaping on a roof, ensuring any roof based hot work is rigorously controlled in line with a formal management system and associated permit etc.

This guidance does not address the exposure to life safety and electric shock hazards.

For a more in depth understanding of the exposures and what risk management measures to take, please see Aviva's Roof Mounted Photovoltaic Solar Panel Systems Loss Prevention Standards:

- Roof Mounted Photovoltaic Solar Panel Systems - General Considerations LPS
- Roof Mounted Photovoltaic Solar Panel Systems - Planning for Installation LPS
- Roof Mounted Photovoltaic Solar Panel Systems - Installation and Construction LPS
- Roof Mounted Photovoltaic Solar Panel Systems - Installed and Ongoing Care LPS
- Roof Mounted Photovoltaic Solar Panel Systems - Isolated End of Life and Decommissioning LPS

15 Top Tips to Help Prevent Fire in Operational PV/Solar Systems

1. **Property Insurer.** Speak with your Property Insurer at the earliest opportunity to establish an agreed risk management strategy.

2. **Risk Assessments.** Ensure all relevant risk assessments, including the premises Fire Risk Assessment, are reviewed, and revised to consider the provision of the PV/Solar systems.

3. **Know Your Panel.** Know the fire rating classification of the PV/Solar panels. In accordance with IEC 61730-2: Class A, Class B, or Class C, with Class C being minimum requirements. For more information on fire resistance testing click here.

4. **Access.** Safe and accessible roof access must be provided or readily created to ensure equipment can be inspected, tested, serviced, and maintained, or accessed in an emergency or fault situation.

5. **OEM & MCS.** Follow Original Equipment Manufacturers and Microgeneration Certification Scheme (in the UK) guidance for inspections, testing, servicing, and maintenance. This should be completed by competent and qualified engineers.
    - Initially:
        i. If an installation conformity certificate or similar has been provided by the installer - 6 months after hand over.
        ii. If not, then after 3 months.
    - Annually thereafter unless there are concerns around the status or performance of the PV/Solar system.
        i. This frequency should be reviewed as the array ages and increased fault and performance issues develop.
    - Aerial (drone surveys) or remote crawler inspections can be used to supplement the above, but not instead of.

6. **Thermographic Surveys.** Of the PV/Solar panels and the entire infrastructure should be completed:
    - Annually if the roof is of non-combustible materials.
    - Every 6 months if the roof features any combustible materials such as asphalt, felt, foam insulation, timber etc.

7. **Cable Protection.**
    - Protect cables from being stepped on or damaged.
    - Ensure cabling doesn't run over sharp edges or through abbrasive or serrated gaps and openings.
    - Check insulation integrity and degradation from the sun/weather.
    - Ensure cabling is located within trunking as far as achievable, which is regularly checked for signs of water ingress.

8. **Self-Inspections.**
    - Regular recorded self-inspections of the roof should be completed at least monthly.
    - Look for damage to the cables, cable connections, panel surface etc.
    - Ensure panel surfaces are clean and undamaged.
    - Spot check panel securement, support framing and bolt tightness.
    - Use thermographic cameras to check for hot spots on the panels themselves, and other components including inverters.

9. **Waste.**
    - Ensure waste and combustible materials, including leaf matter, are not allowed to accumulate on the roof and below the panels, as these may interact with an ignition source and provide further fire load.

10. **Vegetation Growth.**
    - Ensure vegetation is not allowed to grow on the roof, or around the panels. This unwanted vegetation will need to be removed periodically as it can interact with an ignition source and provide further fire load.
    - Special attention is needed if the array is installed on a 'green roof'.

11. **Wildlife.**
    - Ensure vermin, birds, rodents etc. are not nesting or living within the array.

12. **Weather.** Ahead of and/or after any adverse weather events, such as: heavy downpour rain; high winds; storm; lightning; hail, freezing temperatures or snow the array should be inspected:
    - Visually checked to ensure everything is fixed and secured.
    - Visually checked to ensure everything is damage free.
    - Snow, ice, or water is not accumulating, and roof drains are clear.

13. **Isolators.** Ensure the direct current (DC) and alternating current (AC) isolators are:
    - Clearly labelled.
    - Protected from the elements.
    - Located in a clear, clean, and readily accessible area.
    - Maintained and operable.
    - Visually checked at least monthly.

14. **Inverters.** Ensure the inverters are:
    - Not mounted on to combustible construction elements such as foam insulated and/or timber panelling and cladding.
    - Clearly labelled.
    - Ideally installed away from the solar panels in a sun shaded area (at least >2.5m), protected from potential harsh or adverse weather.
    - Located in a secured, clear, clean, sterile, and readily accessible area.
    - Have the appropriate ventilation and air movement around them to prevent over-heating.
    - There are no alarms or fault lights.

15. **Emergency Response Plans & Fire & Rescue Services.** Ensure all site emergency response and evacuation plans are updated, including:
    - Liaison with the public Fire & Rescue Services to establish what resources they have for tackling a roof fire on your property.
        i. Establish how any fire would be extinguished.
        ii. Identify available fire water supplies with appropriate tests.
    - Understand how a fire on the roof would be detected, and what procedures should be followed by employees.
    - Establish appropriate response to isolate the DC and AC supplies.

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Aviva Risk Management Solutions can offer access to a wide range of risk management products and services at preferential rates via our network of Specialist Partners, including:

- General electrical inspections and thermographic imaging: Bureau Veritas
- Fire stopping and passive protection: Checkmate Fire
- Thermographic imaging: PASS
- Automatic fire detection and portable fire extinguishers: SECOM

For more information please visit:

Aviva Risk Management Solutions – Specialist Partners

Sources and Useful Links

Further information on the subjects discussed in this Loss Prevention Standard can be found using the links below.

- Guide to the Installation of Photovoltaic Systems: Published by the Microgeneration Certification Scheme (MCS).
- RISCAuthority document RC62 Recommendations for Fire Safety with PV Panel Installations.
- RISCAuthority document RE3 Need to Know Guide Rooftop-mounted PV Solar Systems.

Additional Information

Other related Aviva Loss Prevention Standards that might be of interest include:

- Contamination Following a Fire LPS
- Control and Management of Combustible Waste Materials LPS
- Electrical Installations Inspection and Testing LPS
- Emergency Response Teams LPS
- External and Internal Third-Party Exposures - Property Protection LPS
- External Wall Insulation Systems LPS
- Fire Compartmentation LPS
- Fire Safety Inspections LPS
- Heat and Smoke Venting Systems LPS
- Hot Work Operations LPS
- Housekeeping - Fire Prevention LPS
- Managing Change - Property LPS
- Managing Contractors LPS
- Smoke Contamination LPS
- Thermographic Surveys LPS

To find out more, please visit Aviva Risk Management Solutions or speak to one of our advisors.

Email us at riskadvice@aviva.com or call 0345 366 6666.*

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